

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Original) An adhesion promotion composition for enhancing adhesion between a copper conducting layer and a dielectric material during manufacture of a printed circuit board, the adhesion promotion composition comprising a corrosion inhibitor, an inorganic acid, an oxidizing agent, and an alcohol which is effective to increase copper-loading in the composition, and the adhesion promotion composition being initially substantially free of transition metals having a tendency to destabilize the oxidizing agent.

2. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of monohydric alcohols.

3. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of monohydric alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

4. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric monohydric alcohols.

5. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric monohydric alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

6. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of dihydric alcohols.

7. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of dihydric alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

8. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric dihydric alcohols.

9. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric dihydric alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

10. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of trihydric alcohols.

11. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of trihydric alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

12. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric trihydric alcohols.

13. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric trihydric alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

14. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of primary alcohols.

15. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of primary alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

16. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric primary alcohols.

17. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric primary alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

18. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of secondary alcohols.

19. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of secondary alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

20. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric secondary alcohols.

21. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric secondary alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

22. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of tertiary alcohols.

23. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of tertiary alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

24. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric tertiary alcohols.

25. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of oligomeric tertiary alcohols and constitutes between about 0.5 wt% and about 20 wt% of the composition.

26. (Original) The adhesion promotion composition of claim 1 wherein the alcohol is triethylene glycol.

27. (Original) The adhesion promotion composition of claim 1 wherein the alcohol is triethylene glycol and constitutes between about 0.5 wt% and about 20 wt% of the composition.

28. (Original) The adhesion promotion composition of claim 1 wherein the composition has a copper-loading capacity of at least about 30 grams copper per liter composition.

29. (Previously presented) The adhesion promotion composition of claim 1 wherein the alcohol is selected from the group consisting of monohydric alcohols, dihydric alcohols, trihydric alcohols, primary alcohols, secondary alcohols, and tertiary

alcohols, and wherein the composition has a copper-loading capacity of at least about 30 grams copper per liter composition.

30. (Original) The composition of claim 1 wherein less than about 0.1 volume % of Cu-containing sludge is formed at 120 hours under ambient conditions when the composition is loaded with between 40 and 50 g/liter Cu ions.

31. (Previously presented) The composition of claim 1 wherein the alcohol is selected from the group consisting of monohydric alcohols, dihydric alcohols, trihydric alcohols, primary alcohols, secondary alcohols, and tertiary alcohols, and wherein less than about 0.1 volume % of Cu-containing sludge is formed at 120 hours under ambient conditions when the composition is loaded with between 40 and 50 g/liter Cu ions.

32. (Original) The adhesion promotion composition of claim 1 further comprising an anionic surfactant.

33. (Previously presented) The adhesion promotion composition of claim 1 further comprising an anionic surfactant selected from the group consisting of polymeric, oligomeric, and monomeric alcohol derivatives.

34. (Previously presented) The adhesion promotion composition of claim 1 further comprising an anionic surfactant selected from the group consisting of alcohol sulfates, sulfonates, and ethoxylates.

35. (Original) The adhesion promotion composition of claim 1 further comprising dodecylbenzene sulfonic acid (DDBSA) as an anionic surfactant.

36. (Original) The adhesion promotion composition of claim 1 further comprising a nonionic surfactant.

37. (Original) The adhesion promotion composition of claim 36 wherein the nonionic surfactant is an ethoxylated alcohol derivative.

38. (Original) The adhesion promotion composition of claim 37 wherein the nonionic surfactant is polyoxyethylene nonylphenol.

39. (Original) The adhesion promotion composition of claim 1 wherein the inorganic acid constitutes at least about 30 wt% of the composition.

40. (Original) The adhesion promotion composition of claim 1 wherein the inorganic acid is a mixture of sulfuric acid and nitric acid and constitutes at least about 30 wt% of the composition.

41. (Previously presented) The adhesion promotion composition of claim 1 further comprising an anionic surfactant and a nonionic surfactant; wherein the inorganic acid is a mixture of sulfuric acid and nitric acid and constitutes at least about 30 wt% of the composition; and wherein the alcohol is selected from the group consisting of monohydric alcohols, dihydric alcohols, trihydric alcohols, primary alcohols, secondary alcohols, and tertiary alcohols and constitutes between about 0.5 wt % and about 20 wt% of the composition.

42. (Original) The adhesion promotion composition of claim 41 wherein the copper-loading of the composition is characterized by less than about 0.1 volume % of Cu-containing sludge being formed at 120 hours under ambient conditions when the composition is loaded with between 40 and 50 g/liter Cu ions.

43. (Original) The adhesion promotion composition of claim 1 wherein the composition is substantially free of thiourea-based complexing agents, and the

corrosion inhibitor is benzotriazole, the inorganic acid comprises sulfuric acid and nitric acid, the oxidizing agent is hydrogen peroxide, and the alcohol is triethylene glycol in the following proportions by weight percent:

0.5 to 8 wt% H₂O₂
16 to 25 wt% H₂SO₄
0.1 to 10 wt% HNO₃
0.1 to 2 wt% 1,2,3-benzotriazole
0.01 to 5 wt% triethylene glycol.

44. (Original) The adhesion promotion composition of claim 1 wherein the composition is substantially free of thiourea-based complexing agents, and the corrosion inhibitor is benzotriazole, the inorganic acid comprises sulfuric acid and nitric acid, the oxidizing agent is hydrogen peroxide, and the alcohol is triethylene glycol in the following proportions:

0.5 to 8 wt% H₂O₂
16 to 25 wt% H₂SO₄
0.1 to 10 wt% HNO₃
0.1 to 2 wt% 1,2,3-benzotriazole
0.01 to 5 wt% triethylene glycol;

and wherein the composition further comprises the following:

0.05 to 2 wt% 2-ethyloxosulfonate
0.0001 to 2 wt% dodecylbenzene sulfonic acid
0.0001 to 2 wt% polyoxyethylene nonylphenol.

45-47. (Cancelled)

48. (Cancelled)

49. (Cancelled)

50-52. (Cancelled)

53. (Cancelled)

54. (Cancelled)

55. (Original) An adhesion promotion composition for enhancing adhesion between a copper conducting layer and a dielectric material during manufacture of a printed circuit board, the adhesion promotion composition comprising a corrosion inhibitor, nitric acid, and an alcohol which is effective to increase copper-loading in the composition.

56. (Original) The adhesion promotion composition of claim 55 wherein the composition further comprises an oxidizing agent and is initially substantially free of transition metal ions having a tendency to destabilize the oxidizing agent.

57. (Original) The adhesion promotion composition of claim 56 wherein the oxidizing agent comprises hydrogen peroxide.

58. (Original) The adhesion promotion composition of claim 57 wherein the composition is substantially free of thiourea-based complexing agents.

59-61. (Cancelled)

62. (New) An adhesion promotion composition for enhancing adhesion between a copper conducting layer and a dielectric material during manufacture of a printed circuit board, the adhesion promotion composition comprising a corrosion inhibitor, an

inorganic acid, an oxidizing agent, and dodecylbenzene sulfonic acid (DDBSA), and the adhesion promotion composition being initially substantially free of transition metals having a tendency to destabilize the oxidizing agent.

63. (New) An adhesion promotion composition for enhancing adhesion between a copper conducting layer and a dielectric material during manufacture of a printed circuit board, the adhesion promotion composition comprising a corrosion inhibitor, an inorganic acid, an oxidizing agent, and sodium 2-ethylhexyl sulfate, and the adhesion promotion composition being initially substantially free of transition metals having a tendency to destabilize the oxidizing agent.

64. (New) An adhesion promotion composition for enhancing adhesion between a copper conducting layer and a dielectric material by formation of an organometallic conversion coating during manufacture of a printed circuit board, the adhesion promotion composition comprising a corrosion inhibitor, an inorganic acid, an oxidizing agent, and polyoxyethylene nonylphenol, and the adhesion promotion composition being initially substantially free of transition metals having a tendency to destabilize the oxidizing agent.